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The bee genus *Chlerogas* in Bolivia (Hymenoptera, Halictidae)

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Abstract

A new species of *Chlerogas* Vachal (Halictinae, Augochlorini) is described and figured from Bolivia, correcting a past mis-association of sexes for *Chlerogas boliviensis* Brooks & Engel. *Chlerogas aterrimus* **sp. n.** is described from two males and a single female collected in the Department of Santa Cruz (Provinces of Florida and Caballero) and is distinguished from *C. boliviensis*, known only from females, and its other congeners. A revised key to the species of *Chlerogas* is provided along with a new locality record for *C. boliviensis*.

Keywords

Andes, Apoidea, Anthophila, Halictinae, Augochlorini, taxonomy, identification key

Introduction

Bees of the genus *Chlerogas* Vachal occur in the mountains of Colombia and Venezuela, south through Ecuador and Peru, into Bolivia, a distribution in South American perfectly analogous with that of the unrelated, but similarly long-headed, genus

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Chlerogella Michener (Engel 2000, Engel 2010). Eleven species have been recognized previously but all are known from a scant few specimens (Brooks and Engel 1999; Engel et al. 2006; Engel and Gonzalez 2009), making this one of the rarer genera of Augochlorini. The genus can be recognized most easily by the combination of its elongate head in males and females (Figs 1–3, 8–10), the reduced number of flagellomeres in males and females, and the pectinate inner metatibial spur in males (Engel 2000).

In February of this year I received for examination three specimens (two females and one male) of *Chlerogas* collected in Santa Cruz Department, Bolivia. While one proved to be a relatively shiny example of a female *C. boliviensis* and the single male a black to dark brown individual clearly conspecific to the male I described in 2009 as the previously unknown male for this same species (Engel 2009a), the third specimen was of a distinctly black to dark brown female. Upon inspection this second female was obviously associated with the male based on observable features and, while close to the female of *C. boliviensis*, was apparently not conspecific. Accordingly, I believe my previous association (Engel 2009a) of a male to *C. boliviensis* was in error. The new series before me demonstrates that the three black *Chlerogas* from Santa Cruz (my original male and the male and female newly revealed) represent an undescribed species, while the actual male of *C. boliviensis* remains elusive and undiscovered. It is ironic that having waited nearly nine years to publish on the specimen I earlier associated with *C. boliviensis* in the hopes of further material becoming available (Engel 2009a), that such specimens which herein help to refine my circumscriptions of these rare species should make their appearance so quickly thereafter. Such a thing highlights the dynamic nature of systematics and that, no matter how patient one may or may not be, at any moment material may become available to revise our understanding and recast our interpretations. I herein provide a description of this species and update the existing key to species in the hope of encouraging those working in the Andean region to seek these rare bees with diligence.

The morphological terminology and format for the descriptions follows that used previously in my studies of *Chlerogas* (Brooks and Engel 1999; Engel et al. 2006; Engel and Gonzalez 2009; Engel 2009a), except following terminological revisions of Engel (2009b). The figures are essentially those of Engel (2009a) with supplements. Table 1 summarizes the information available for the 12 currently recognized species. Abbreviations for collections cited herein are: AMNH, American Museum of Natural History (New York, New York); SEMC, Snow Entomological Collections, Division of Entomology, University of Kansas Natural History Museum (Lawrence, Kansas); NHML, Natural History Museum (London, UK).

Table 1. Revised summary of currently recognized species of *Chlerogas* Vachal (Halictinae, Augochlorini). Known sexes are indicated along with ranges of elevation at which each species has been captured (estimated for three species).

Species	Sex	Elevation	Localities
C. araguaensis Brooks & Engel	♂	2000m	Aragua, Venezuela
C. aterrimus **sp. n.**	♀♂	1800–2030m	Santa Cruz, Bolivia
C. boliviensis Brooks & Engel	♀	2000–2030m	La Paz & Santa Cruz, Bolivia
C. colombiensis Brooks & Engel	♂	– [est. 2100m]	Retiro, Colombia
C. cooperi Engel et al.	♀♂	2100m	Baños, Ecuador
C. cyaneus Brooks & Engel	♀♂	2000–[2400]m	Baeza, Ecuador; central Colombia
C. chlerogas (Vachal)	♀♂	1900m	Callanga & Machu Picchu, Peru
C. hirsutipennis Cockerell	♂	– [est. 2200m]	Huascaray [nr. Lima], Peru
C. nephos Brooks & Engel	♀	– [est. 1500m]	nr. Medellín, Colombia
C. tatamaensis Engel & Gonzalez	♂	2430m	Tatamá, Colombia
C. tiara Brooks & Engel	♀♂	1200m	Tiara, Venezuela
C. townesi Brooks & Engel	♀♂	1510–2400m	Lara, Mérida, & Trujillo, Venezuela

Systematics

Genus *Chlerogas* Vachal

***Chlerogas aterrimus* Engel, sp. n.**
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Figs 1–10

"*Chlerogas boliviensis* Brooks and Engel"; Engel, 2009a: 450 [♂, misidentification].

Holotype. ♂, Bolivia: Santa Cruz [Department], Florida Prov. [Province], 11 km NE Achira, 1800 m, 3-xi-1999 [3 November 1999], C. Porter & L. Stange, cloud forest (SEMC).

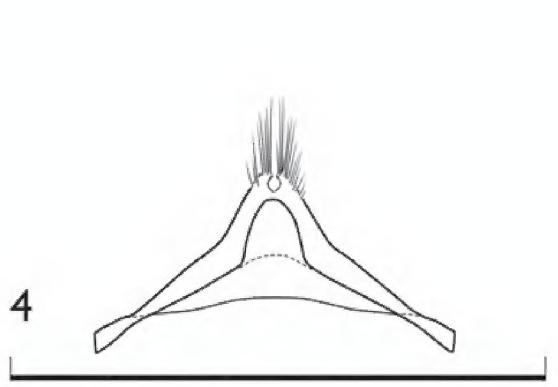
Paratypes. 1♂, 1♀, Bolivia: Sta. Cruz Dept. [Santa Cruz Department], Caballero Prov. [Manuel Maria Caballero Province], PN Amboró [Parque Nacional Amboró], 17°50'3"S, 64°23'26"W, 2030 m, X.17–20.2001 [17–20 October 2001], S. Spector & J. Ledezma, flight intercept trap (AMNH).

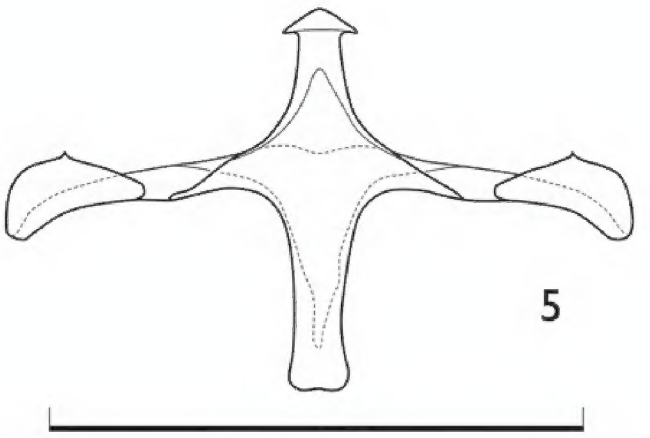
Diagnosis. This species can be most readily recognized for the black to dark brown coloration and the basal area of the propodeum lacking distinct striae reaching to the apical margin. For those species in which males are known the structure of the exposed (*vide infra*) and hidden sterna (Figs 4–5), as well as the genitalia (Figs 6–7) are diagnostic.

Description. *Male*: Total body length 13 mm; forewing length 8.6 mm. Head 1.56 times longer than wide, narrower than mesosoma (length 3.23 mm, width 2.07 mm). Gena nearly as broad as compound eye in profile. Base of clypeus below lower tangent of compound eyes; lower interorbital distance 0.77 mm; upper interorbital

Figures 1–3. Holotype male (SEMC) of *Chlerogas aterrimus* sp. n. **1** Lateral habitus **2** Facial aspect **3** Lateral aspect of head.

distance 0.93 mm; torular-ocular distance 0.20 mm; torular-median ocellar distance 0.65 mm; distance between lateral ocelli 0.23 mm; distance between lateral ocellus and median ocellus 0.08 mm; ocellocular distance 0.22 mm. Scape not reaching to lateral ocellus; pedicel as long as wide; FI as long as wide, about as long as pedicel, length 0.18 mm; remaining flagellomeres (F) longer than wide; FII 0.27 mm in length; FIII–IV each 0.40 mm in length; FV–VII each 0.43 mm in length; FVIII–IX each 0.47 mm in length; FX 0.67 mm in length. Intertegular distance 1.73 mm; mesoscutellum





Figures 4–7. Male terminalia of holotype of *Chlerogas aterrimus* sp. n. (scale bars = 1 mm) **4** Metasomal sternum VII **5** Metasomal sternum VIII **6** Genital capsule and everted endophallus with spicules omitted (left is dorsal aspect, right is ventral aspect) **7** Lateral aspect of genital capsule and endophallus (volsella omitted for clarity, spicules omitted on endophallus).

weakly bituberculate (paramedially). Basal area of propodeum shorter than mesoscutellum, slightly longer than metanotum. Forewing with basal vein distad cu-a by 1.5 times vein width; 1rs-m distad 1m-cu by twice vein width; 2rs-m distad 2m-cu by 7 times vein width; marginal cell length 2.3 mm, width 0.50 mm; first submarginal cell about as long as combined lengths of second and third submarginal cells (as measured along their posterior borders); second submarginal cell slightly narrowed anteriorly; anterior border of second submarginal cell along Rs shorter than anterior border of third submarginal cell; distal hamuli arranged 3-1-3. Inner metatibial spur with 3–4

Figures 8–10. Paratype female (AMNH) of *Chlerogas aterrimus* sp. n. **8** Lateral habitus **9** Facial aspect **10** Lateral aspect of head.

branches, not including apical portion of rachis. Metasomal sternum IV apically with paramedial patches of dense golden setae; metasomal sternum V gently concave medially, with distinct, pale gold setae fringing apical borders except in medial concavity; metasomal sternum VI deeply concave medially, with dark gold to fuscous setae except medially along inner and proximal border of concavity; hidden sterna and genitalia as in figures 4–7.

Clypeus and supraclypeal area colliculate with coarse, shallow punctures separated by a puncture width or less; malar space colliculate; remainder of face with small, well-defined, nearly contiguous punctures, such punctures blending with colliculate integument on vertex; gena and postgena strongly imbricate to colliculate. Pronotum

strongly imbricate; mesoscutum imbricate with small, well-defined punctures separated by less than a puncture width except punctures weak around midline and anteromedially, in such areas punctures separated by a puncture width or slightly more; mesoscutellum imbricate with punctures separated by a puncture width or slightly less, medially between tubercles punctures faint; metanotum faintly imbricate with small punctures separated by a puncture width or less; pleura strongly imbricate to colliculate with coarse, shallow punctures separated by 0.5–2 times a puncture width; lateral and posterior surfaces of propodeum imbricate with scattered small punctures on lateral surfaces, basal area strongly granular to imbricate, without distinct longitudinal striae reaching apical margin, although with exceedingly short, weak strigae at extreme base laterally and sometimes medially. Metasoma weakly imbricate, with scattered minute punctures.

Coloration of head, including scape and pedicel, and mesosoma black to dark brown (Figs 1–3); labrum, mouthparts, antennal flagellum, tegula, legs, and metasoma dark brown. Generally lacking metallic highlights except some scattered, faint, dark metallic blue to purple or coppery highlights on mesosoma and head; wings infumate. Pubescence generally white except as noted above.

Female: As described for the male with the following modifications: Total body length 13.1 mm; forewing length 9.3 mm. Head 1.56 times longer than wide, narrower than mesosoma (length 3.70 mm, width 2.19 mm). Lower interorbital distance 1.04 mm; upper interorbital distance 1.04 mm; torular-ocular distance 0.34 mm; torular-median ocellar distance 0.68 mm; distance between lateral ocelli 0.26 mm; distance between lateral ocellus and median ocellus 0.10 mm; ocellocular distance 0.26 mm. Intertegular distance 1.98 mm; mesoscutellum not tuberculate, faintly bigibbous. Inner metatibial spur with four branches, not including apical portion of rachis.

Pubescence of head and mesosoma intermingled with more erect black setae; setae of scape black; setae of legs black; tergal setae largely fuscous or fuscous golden apically.

Etymology. The specific epithet is based on the Latin term *ater*, meaning "black", and is a reference to the dark coloration of this species relative to its Bolivian congener, *C. boliviensis*.

Chlerogas boliviensis Brooks & Engel

Chlerogas boliviensis Brooks and Engel, 1999: 468 [♀].

"*Chlerogas boliviensis* Brooks and Engel"; Engel, 2009a: 450 [♂, misidentification, actually *C. aterrimus*, sp. n., *vide supra*].

New record. ♀, Bolivia: Sta. Cruz Dept. [Santa Cruz Department], Caballero Prov. [Manuel Maria Caballero Province], PN Amboró [Parque Nacional Amboró], 17°50'3"S, 64°23'26"W, 2030 m, X.17–20.2001 [17–20 October 2001], S. Spector & J. Ledezma, flight intercept trap (AMNH).

Older records. Bolivia: 1♀, La Paz [Department], Chulumani [Sud Yungas Province], cloud forest [17°10'S, 65°19'W], c. 2000 m, 27–29 June 1979, M. Cooper (NHML: holotype); 1♀, La Paz [Department], Chulumani [Sud Yungas Province], cloud forest [17°10'S, 65°19'W], c. 2000 m, 5 April 1979, M. Cooper (NHML: paratype).

Key to species of *Chlerogas*

The key presented here is corrected and updated from that provided by Engel and Gonzalez (2009).

1. Antenna with 10 flagellar articles; medioapical margin of metasomal tergum V entire (males) **2**
– Antenna with nine flagellar articles; medioapical margin of metasomal tergum V with slit (females) **11**
2(1). Metasomal terga metallic green to blue; legs dark brown to black..... **3**
– Metasomal terga and legs largely amber to brown or black, not metallic..... **4**
3(2). Integument between punctures ventrally on mesepisternum polished smooth or very faintly imbricate and shining; basal area of propodeum with weak striae in basal quarter to third (Peru) ..... ***C. chlerogas* (Vachal)**
– Integument between punctures ventrally on mesepisternum strongly imbricate and weakly shining; basal area of propodeum with distinct and complete striae (Colombia, Ecuador) ..... ***C. cyaneus* Brooks & Engel**
4(2). Head and mesosoma not metallic, brown to black; leg coloration variable **5**
– Head and mesosoma metallic green to blue, sometimes coloration is rather subdued on mesosoma and face (*i.e.*, *C. tatamaensis*); legs largely amber, never entirely dark brown to black..... 7
5(4). Legs largely amber; apex of clypeus with transverse amber marking..... **6**
– Legs dark brown to black, without amber podites or markings; apex of clypeus with narrow brown or amber (Bolivia)..... ***C. aterrimus* sp. n.**
6(5). Metasomal sterna I–III brown (Peru) ..... ***C. hirsutipennis* Cockerell**
– Metasomal sterna I–III amber (Ecuador) ..... ***C. cooperi* Engel et al.**
7(4). Metasomal terga I and II amber with transverse dark brown bands **8**
– Metasomal terga I and II entirely amber (Colombia)..... ***C. colombiensis* Brooks & Engel**
8(7). Antennal scape dark brown to black..... **9**
– Antennal scape entirely amber (Venezuela)..... ***C. tiara* Brooks & Engel**
9(8). Apical margin of metasomal sternum V deeply concave **10**
– Apical margin of metasomal sternum V entire (Venezuela)..... ***C. araguaensis* Brooks & Engel**
10(9). Integument around median line of mesoscutum with well defined, small punctures separated by 0.5–1.75 times puncture width and imbricate; metallic green of head and mesosoma brilliant and shining (Venezuela)..... ***C. townesi* Brooks & Engel**

– Integument around median line of mesoscutum granulose and imbricate, with shallow, ill-defined largely contiguous punctures; metallic green of head and mesosoma dark and subdued, particularly on mesosoma where it appears largely as highlights dorsally or as dark metallic green on pleura and propodeum (Colombia) ..... ***C. tatamaensis*** **Engel & Gonzalez**

11(1). Metasomal terga metallic green to blue, or nearly black with scattered metallic highlights; legs dark brown to black, without amber coloration..... 12

– Metasomal terga without metallic coloration, instead amber and/or brown; legs largely amber, although some with extensive brown markings **15**

12(11). Basal area of propodeum with distinct striae, sometimes only basally..... **13**

– Basal area of propodeum granular, without distinct striae..... **14**

13(12). Basal area of propodeum with distinct and complete striae; integument between punctures ventrally on mesepisternum strongly imbricate and weakly shining; malar space to compound eye length ratio 0.37 (Colombia, Ecuador)..... ***C. cyaneus*** **Brooks & Engel**

– Basal area of propodeum with weak striae in basal quarter to third; integument between punctures ventrally on mesepisternum polished smooth or very faintly imbricate and shining; malar space to compound eye length ratio 0.48 (Peru)..... ***C. chlerogas*** **(Vachal)**

14(12). Head and mesosoma dark metallic blue-green or green with blue and purple highlights; metasoma metallic green with scattered to strong blue to purple highlights (Bolivia) ..... ***C. boliviensis*** **Brooks & Engel**

– Head and mesosoma black to dark brown with faint metallic highlights; metasoma black to dark brown (Bolivia) ..... ***C. aterrimus*** **sp. n.**

15(11). Face brilliant metallic green or brassy green..... **16**

– Face black or dark brown, with green or gold highlights (Ecuador) .... ***C. cooperi*** **Engel et al.**

16(15). Mesoscutum with median longitudinal area of dark brown to black, nonmetallic integument, laterally metallic green **17**

– Mesoscutum entirely metallic green (Colombia)..... ***C. nephos*** **Brooks & Engel**

17(16). Metasomal tergum II almost entirely brown; malar space to compound eye length ratio 0.32 (Venezuela) ..... ***C. tiara*** **Brooks & Engel**

– Metasomal tergum II entirely amber, or nearly so; malar space to compound eye length ratio 0.41 (Venezuela) ..... ***C. townesi*** **Brooks & Engel**

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